

REMARKS/ARGUMENTS

Favorable consideration and allowance are respectfully requested for claims 1 and 4 in view of the foregoing amendments and the following remarks.

Claim 1 is amended to recite that the internal diameter of the air-blowing pipe is smaller than the internal diameter of the branch pipe. This amendment is supported by Figures 1-5 of the present application. Claim 1 is also amended to recite that the end of the air-blowing pipe reaches the side of the branch pipe. This amendment is supported by Figures 2b, 3a and 3b of the present application. Claim 1 is also amended to recite that the pipes meet at a perpendicular angle or some other angle. This amendment is supported by lines 13-17 on page 15 of the application, as well as Figures 1-3(b). Claim 1 is also amended to recite that an upstream side of the air-blowing pipe is streamlined for stabilizing a cavity of the circulating absorption liquid which is generated at the downstream side of the air-blowing pipe and further minimizing pressure fluctuations in the absorption liquid. This amendment finds support on pages 14 and 15 of the application. Claim 1 is also amended to indicate that the location of the branch pipe maximizes the efficiency of oxidizing the circulating absorption liquid. Support for this amendment appears throughout the specification, for instance in the last paragraph on page 6 of the specification.

Claim 4 is amended to clarify that the end of the air-blowing pipe is inserted into the branch pipe. This amendment finds clear support throughout

the specification, for instance on page 14, line 7. Accordingly, no new matter is introduced by these amendments.

The Examiner is thanked for the careful review and consideration of this application and the withdrawal of the rejection of claims 1 and 4 over Tamaru *et al.* in view of Johnson.

The rejection of claims 1 and 4 under 35 U.S.C. §103(a) over Tamaru *et al.* (JP 08-000950) in view of Dijkstra (US 2,953,306) and Deering *et al.* (US 3,342,193) is respectfully traversed.

Claim 1 relates to a wet-gas desulfurizing device that removes oxides of sulfur from combustion exhaust gas by scrubbing the combustion exhaust gas with an absorption liquid which contains an alkali. The device includes a branch pipe for circulating absorption liquid. The branch pipe extends into a collection tank through the wall of the collection tank. The discharge end of the branch pipe discharges the circulating absorption liquid into absorption liquid in the collection tank. Finally, the branch pipe has an internal diameter D. An air-blowing pipe is provided to inject air into the branch pipe and is inserted into the branch pipe so that the central axis of the air-blowing pipe meets the central axis of the branch pipe at an angle. One end of the air-blowing pipe opens in the branch pipe and is streamlined on one side, facing upstream from the collection tank and is a semicircular trough facing downstream towards the collection tank.

The insertion point of the air-blowing pipe into the branch pipe is between $3D$ and $10D$ from the discharge end of the branch pipe.

Claim 4 depends from claim 1 and adds that the end of the air-blowing pipe which is inserted into the branch pipe has an internal diameter of about $0.4D$ to $0.7D$.

Tamaru discloses a wet-gas desulfurizing device for absorbing sulfur oxide of an exhaust gas with an absorption liquid. As indicated in the Office Action, "Tamaru *et al.* are silent as to the air-blowing pipe 14 being inserted into the branch pipe at an insertion point 13 located between $3D$ and $10D$ from the discharge end of the pipe 12."

Tamaru does not teach or even suggest that there may be any benefit provided by inserting the air-blowing pipe at one location on the branch pipe or another, much less that the location of the air-blowing pipe may be critical. This is because Tamaru teaches the use of an agitator 119 to disperse air through the collection tank 102. See paragraph [0019] of Tamaru, describing an impeller 8 driven by a motor 9 which causes a flow of liquid and agitation of solution.

Tamaru also does not describe that the air-blowing pipe is shaped as a semicircular trough facing downstream as it opens in the branch pipe. Nor does Tamaru teach that the air-blowing pipe is inserted in the branch pipe so that a central axis of air-blowing pipe meets a central axis of the branch pipe at an angle. Moreover, Tamaru does not indicate that the free end of the air-blowing

pipe reaches the other side of the branch pipe or that the upstream side of the air-blowing pipe is streamlined so as to stabilize a cavity of the circulating absorption liquid.

Dijkstra teaches an apparatus for dispersing a gas within a body of liquid contained in a vessel. As correctly stated in the Office Action, Dijkstra is silent as to whether the air of air-blowing pipe may be configured as a semicircular trough that faces downstream. The Office Action asserts that the statement in Dijkstra that "While circular orifices were shown, it is event that other shapes may be used," (column 5, lines 15-20) somehow indicates that the shape of the end of the gas blowing pipe is not critical. This conclusion does not logically follow from this statement. A teaching that other shapes may be used is just that, it says nothing about the merit of using other shapes. What this does show is that Dijkstra did not appreciate the significance of the precise shape of the end of the gas-blowing pipe. Assuming the suggestion that other shapes may be used is somehow indicative that shape is of little importance, the reference effectively teaches away from trying to modify the shape to improve the system or achieve better results, since one of skill in the art would then believe that the shape has no bearing on the operation of the system.

Accordingly, this statement provides no support for the thought or suggestion that the precise shape of the end of the gas-blowing pipe is not absolutely critical to the functioning of the apparatus. The statement merely

illustrates how limited the teachings of this reference are. The statement shows that Dijkstra had no idea that the shape of the end of the gas-blowing pipe can be highly significant. Accordingly, the reference provides a person of skill in the art no indication that the shape of the end of the gas-blowing pipe might be of any consequence. Further, if one accepts the position of the office action that the reference suggests the shape at the end of the air-blowing pipe is not critical, the reference effectively teaches away from trying to modify the proposed shape and there is, then, no teaching or suggestion or other motivation provided by the reference to try to use different shapes for the end of the gas-blowing pipe.

The Office Action indicates that changes in shape merely involve routine skill in the art. Such thinking, however, is completely inapplicable to the present case where the shape of the semicircular trough is critical to the effective operation of the invention. Moreover, merely suggesting that other shapes may be used does not amount to a teaching or suggestion that a pipe with an end shaped as presently claimed should, or even could, be used.

Moreover, Dijkstra does not indicate that the free end of the air-blowing pipe reaches the other side of the branch pipe. In fact, Figures 3 and 4 show the free end of the air-blowing pipe on the same axis as the branch pipe, thus the air-blowing pipe could not extend to the side of the branch pipe. Further, Dijkstra does not teach that the upstream side of the air-blowing pipe is streamlined so as to stabilize a cavity of the circulating absorption liquid.

Deering teaches a method and nozzle for injecting one fluid into another fluid. The nozzle shown in Deering is simply inserted into the wall of a relatively large liquid vessel 40. This is nothing like the apparatus of the presently claimed invention which includes an air-blowing pipe which injects air into a branch pipe which carries a liquid into a collection tank. Accordingly, a person of skill in the art would have no reason to try to combine the teachings of Deering with those of Dijkstra or Tamaru so as to arrive at the present invention. Even assuming, *arguendo*, that one were so inclined to try to combine these references, one would still not arrive at the presently claimed invention. None of the cited references teach that the free end of the air-blowing pipe reaches the further side of the branch pipe. Figure 8 of Deering makes clear that the nozzle 46 does not reach all the way across the vessel 40. Figures 3 and 4 of Dijkstra clearly show that the orifice 7 of the gas duct 6 is free and does not engage the side of the liquid pipe 10.

Further, none of the references teach that the end of the air-blowing pipe has a semicircular trough shape, or that the upstream side of the end of the air-blowing pipe is streamlined.

Accordingly, the cited references fail to teach each and every element of the presently claimed invention. Moreover, there is no suggestion or motivation provided to try to combine these separate references or to try to modify them so as to arrive at the present invention. In fact, given that Tamaru provides an

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entirely separate apparatus, namely an agitator, to achieve the desired effect of properly mixing a liquid and a vapor, one of skill in the art would have no motivation to try to modify the Tamaru apparatus so as to arrive at the presently claimed invention. The *Manual of Patent Examining Procedure* (MPEP) § 706.02(j) (8th Ed. August 2001) requires both (i) a suggestion or motivation to modify a reference or combine reference teachings and (ii) a combination of references that teaches all of the claim limitations. Neither of these requirements is met by the cited references, and accordingly the obviousness rejection cannot be properly maintained. Reconsideration and withdrawal of this rejection is respectfully requested.

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CONCLUSION

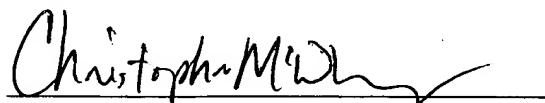
In view of the foregoing, it is respectfully submitted that the application is in condition for allowance, and prompt favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (CAM #037083.48707US).

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Respectfully submitted,



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